

Curriculum Vitæ

Philipp Hennig

Date of birth: 7th of July, 1980
Place of birth: Ludwigsburg, Germany
Nationality: German

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Scientific Interests and Skills

I am an expert in *probabilistic inference* – the mathematical theory of acquisition of knowledge from data. While I am generally interested in all its aspects, the main focus of my work are machines that *actively seek knowledge*. Related scientific communities include machine learning, statistics, numerical optimisation, experimental design, control, operations research, stochastic analysis, numerical analysis, and robotics. I have particular expertise with approximate inference methods, such as free energy formulations and Monte Carlo methods, as well as kernel methods and nonparametric Bayesian methods. My work has found application in computer linguistics, cancer therapy, automated game playing, psychometrics, robotics, and others. I enjoy discussing theoretical and empirical issues of knowledge, uncertainty and decision making with students and peers.

Academic Career

07 / 2011 – current: Max Planck Institute for Intelligent Systems, Tübingen, Germany

Research Scientist; Department of Empirical Inference (Bernhard Schölkopf)

03 / 2011 – 06 / 2011 Max Planck Institute for Intelligent Systems, Tübingen, Germany

Max Planck Postdoc Scholar; Department of Empirical Inference (Bernhard Schölkopf)

11 / 2010 – 01 / 2011 Engineering Department, University of Cambridge, UK

Visiting Researcher; Computational and Biological Learning Laboratory (Carl Rasmussen, Zoubin Ghahramani)

2008 – 2010 Microsoft Research Ltd., Cambridge External Consultant

07 / 2008 – 10 / 2008 Microsoft Research Ltd., Cambridge Research Intern

10 / 2007 – 11 / 2010 Cavendish Laboratory and Robinson College, University of Cambridge, UK

PhD in Physics. Title: *Approximate Inference in Graphical Models*. Supervisor: David J C MacKay
viva voce examination on 11 Jan 2011, graduation on 30 April 2011

04 / 2006 – 04 / 2007 Max Planck Institute for Medical Research, Heidelberg, Germany

“Diplom”-thesis (20,000 words, one year of full-time research). Title: *Point-Spread Functions for backscattered imaging in the Scanning Electron Microscope*. Supervisor: Winfried Denk

10 / 2001 – 03 / 2007 Faculty of Physics, University of Heidelberg, Germany

Undergraduate and graduate studies towards the ‘Diplom’ degree in physics (a five year degree, including one year full-time research). Graduated in March 2007, overall grade point average 1.1 (scale from 1.0 [‘excellent’] to 4.0 [‘sufficient’])

10 / 2004 – 06 / 2005 Department of Physics, Imperial College, London, UK

Participation in the theoretical physics MSc ‘Quantum Fields and Fundamental Forces’ as an Erasmus exchange student. 75% grade point average in final examinations, ‘Imperial College International Diploma’ awarded 11/2005. Erasmus students generally cannot be awarded MSc degrees, but I passed all necessary examinations for the degree

Peer-Reviewed Publications (chronological, solid arrows indicate work as (co-)principal author)

————— under review —————

- ▶ P. Hennig, M. Kiefel — **Quasi-Newton Methods – A New Direction**, under review by the *Journal of Machine Learning Research*, 2012
- ▶ P. Hennig, C. Schuler — **Entropy Search for Information Efficient Global Optimization**, under review by the *Journal of Machine Learning Research*, preprint at arxiv:1112.1217
- ▷ J.P. Cunningham, P. Hennig, S. Lacoste-Julien — **Integrating Gaussians with Expectation Propagation**, under review by the *Journal of Machine Learning Research*, preprint at arxiv:1111.6832

- ▶ P. Hennig, M. Kiefel — **Quasi-Newton Methods – A New Direction**, *International Conference on Machine Learning* 2012
- ▷ B. Bócsi, P. Hennig, L. Csató, J. Peters — **Learning Tracking Control with Forward Models** *International Conference on Robotics and Automation* 2012
- ▶ P. Hennig, D. Stern, R. Herbrich, T. Graepel — **Kernel Topic Models**, *Artificial Intelligence and Statistics* 2012
- ▶ P. Hennig — **Optimal Reinforcement Learning for Gaussian Systems** *Advances in Neural Information Processing Systems* 2011
- ▶ P. Hennig — **Approximate Inference in Graphical Models** PhD thesis, University of Cambridge
- ▷ Bangert, M., Hennig, P., Oelfke, U. — **Using an infinite von Mises-Fisher Mixture Model to Cluster Treatment Beam Directions in External Radiation Therapy**, 2010, *International Conference on Machine Learning and Applications*
- ▶ P. Hennig, D. Stern, T. Graepel — **Coherent Inference on Optimal Play in Game Trees**, 2010, *Artificial Intelligence and Statistics, and Journal of Machine Learning Research W&CP* 9
- ▶ P. Hennig, D. Stern, T. Graepel — **Bayesian Quadratic Reinforcement Learning**, 2009, workshop poster at *Neural Information Processing Systems 2009*
- ▶ Hennig, P. — **Expectation Propagation on the Maximum of Correlated Normal Variables**, 2009, arXiv:0910.0115
- ▶ P. Hennig, W. Denk — **Point-spread functions for backscattered imaging in the scanning electron microscope**, *Journal of Applied Physics* **102**, 123101 (2007)

Patents

- ▶ P. Hennig, D. Stern, T. Graepel, R. Herbrich — **Topic Models (Application)**, patent application filed by Microsoft Research Ltd. on 10/26/2010, serial number 12/912428

Teaching

SS 2012 Co-Organizer, Seminar “Lernende Roboter”, Technische Universität Darmstadt

29/3/2012 Invited 1-day course, “Spring School on Human Modelling”, Ludwig-Maximilian Universität München

WS 2011/12 Co-Organizer, Seminar “Autonome Lernsysteme”, Technische Universität Darmstadt

academic years 2007/08, 08/09 Supervisor for 9 students (in groups of 2 or 3) in the advanced physics track (Physics A and B) of part IB of the Natural Science Tripos at the University of Cambridge, Robinson College (Classical Dynamics, Thermodynamics, Fluid Dynamics, Electrodynamics)

SS 2003 Teaching Assistant for the first-year course in Calculus; Faculty of Mathematics, University of Heidelberg

Community

Contributed Reviews for

- ▶ Robotics Science and Systems (RSS) 2012
- ▶ Machine Learning Summer School (MLSS) 2012
- ▶ European Workshop on Reinforcement Learning (EWRL) 2012
- ▶ Artificial Intelligence and Statistics (AISTATS) 2012
- ▶ Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO, Dutch funding body) 2012
- ▶ Neural Information Processing Systems (NIPS) 2011
- ▶ Data Mining and Knowledge Discovery (Springer Journal)
- ▶ Journal of Machine Learning Research
- ▶ International Conference for Machine Learning (ICML) 2010, 2012
- ▶ Conference on Learning Theory (COLT) 2009

Conferences & Workshops

- ▶ *Machine Learning Summer School*, La Palma, 2012: local arrangements chair
- ▶ *AISTATS 2012*, La Palma: session chair for the session on kernel methods

Outreach co-founded the *Cambridge University Statistics Clinic* at the Centre for Mathematical Sciences, in Michaelmas 2009, which aims to help non-statisticians from all academic fields make more of their data. The clinic remains active after my departure. See also <http://www.statslab.cam.ac.uk/clinic/>.

Student Community student delegate to the Faculty Council and the Board of Graduate Studies at Heidelberg (2 terms), 2003/04/05. President of Robinson College Graduate Student Association (MCR) in 2009/10

Invited Talks & Visits (excluding conference presentations)

- ▶ Max Planck Institute for Neurobiology, Munich, 2012
- ▶ Spring School on Human Modeling, Ludwig-Maximilian Universität Munich, 2012
- ▶ Heidelberger Life-Science Lab, 2012
- ▶ Technische Universität Darmstadt, Intelligent Autonomous Systems Lab, Oberseminar, 2011
- ▶ Deutsches Krebsforschungszentrum Heidelberg, Physical Models group, 2011
- ▶ University College London, Gatsby Computational Neuroscience Unit, 2011
- ▶ Cambridge University, Computational Biological Learning Group, 2011
- ▶ Microsoft Research Cambridge Ltd., 2011

Selected Scholarships & Awards

03 / 2011 – 06 / 2011 Max Planck Postdoc Scholarship

Max Planck Society (MPI for intelligent Systems)

10 / 2007 – 10 / 2010 Microsoft Research PhD Scholarship

Competitive PhD scholarship (20 places awarded throughout Europe). Total value £66,000

since 10 / 2007 Honorary Scholar of the Cambridge European Trust

Originally including partial PhD funding (declined), subsequently changed to honorary status

07 / 2005 Lindau Nobel Laureate Meetings, student stipend

Competitive travel stipend (11,000 applicants / 500 places) for the annual meeting of Laureates

References (please do not contact my referees without my permission)

Prof. Bernhard Schölkopf

Director

MPI for Intelligent Systems

Spemannstraße 38

72076 Tübingen, Germany

bernhard.schoelkopf@tuebingen.mpg.de

Prof. David J.C. MacKay

Chief Scientific Advisor

Dpt. of Energy and Climate Change

3 Whitehall Place

London SW1A 2HD, UK

csa@decc.gsi.gov.uk

Dr. Thore Graepel

Senior Researcher

Microsoft Research Ltd.

Roger Needham Building

CB3 0FB Cambridge, UK

ThoreG@microsoft.com

Prof. Winfried Denk

Director

MPI for Medical Research

Jahnstraße 29

69120 Heidelberg, Germany

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Prof. Jan Peters

FG Intelligente Autonome Systeme

Technische Universität Darmstadt

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